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The conference focused on: Human Factors in Industrial and Consumer Products and Services. The following themes were addressed: User centered design, usability and accessibility; user requirements; user mental models; biomechanical modeling; simulation and intelligent agents; Transportation; Space and aviation; Telecommunication and web applications; Consumer products; and Customer care and services.

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Abstracts HFES Europe Chapter Turin 2005

ORAL Presentations

A user-centred approach in developing preventive safety systems

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Many books have been written concerning the importance of user centered product development, but reality is often far from theory. This is a presentation of another story where the customers and users got the opportunity to review future automotive safety applications and communicate their opinions and demands to the engineers. The product development is a part of PReVENT, an Integrated Project co-funded by the European automotive industry and the European Commission. The goal of the preventive safety applications is to help drivers avoid or mitigate accidents through the use of in-vehicle systems which sense the nature and significance of the danger. Focus group interviews where carried out with truck drivers and owners to collect feedback on functionality, interface and acceptance in order to gather knowledge on how they would like to have it. The results showed an awareness of the need for safety applications and that user acceptance depends on the reliability of the applications and the drivers feeling of control of the vehicle. Next step is a user test of the safety application prototypes to continue the user feedback throughout the product development.

Self-explaining and forgiving roads to improve safety

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Each year more than 40,000 road users are killed in the European Union (EU), while at least 3.5 million are injured severely enough to be reported. The annual cost of the road accidents amounts to at least 160 billion Euros and incredible human suffering. Vehicle occupants are the largest part of this, i.e. 57% of total EU road deaths. Whilst the traffic system as a whole is least safe for vulnerable road users, car occupants run the largest death risk. Studies on effectiveness of casualty reduction measures demonstrated that the largest reduction is expected from vehicle crash protection (15%), driving-while-intoxicated measures is second with 11%, while road safety engineering measures will result in a reduction of 6.5%.

Due to the high cost of such measures, infrastructure improvements are not expected to significantly contribute to a major reduction of road fatalities. However, the use of new technologies may become the catalyst towards achieving the EU goal of 50% accident reduction in 2010, especially when a suitable combination of new technologies with existing infrastructure, or with limited improvements of it, may lead to much more cost-effective solutions.

The EU project IN-SAFETY aims to use intelligent, intuitive and cost-efficient combinations of new technologies and traditional infrastructure best practice applications, in order to enhance the forgiving and

self-explanatory nature of roads, by a number of approaches. For instance, assessing the potential and cost-effectiveness of combined use of new technologies and innovative HMI concepts, developing new simulation models, risk analysis tools, and training tools for road, TMIC and tunnel operators, harmonising signing and personalising their information, and issuing priority implementation scenarios.

User-Centered Design of In-Vehicle Route Guidance Systems

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Existing in-vehicle route guidance systems (RGSs) present a generic form of route guidance information to all users. However, a growing body of literature indicates that drivers differ in their navigational strategies, abilities, and preferred RGS information format. A recent series of investigations examined driver route learning and cognitive mapping as a function of the type of RGS provided. Specifically, RGS modality and information format were manipulated in two investigations. Drivers were required to navigate through unfamiliar areas along specified routes in a high-fidelity driving simulator while using the RGS format. Navigational performance as a function of RGS format was compared to drivers' self-reported navigational strategy and ability. Experiment 1 compared an ego-centered auditory route guidance system (ARGS) and a geo-centered visual-map guidance system (VMGS) or both the ARGS and the VMGS. Experiment 2 compared an ARGS providing either standard instructions or instructions enhanced by either cardinal heading or salient landmark information. In general, drivers reported lower subjective ratings of workload when using the ARGS either by itself or in combination with the VMGS. However, drivers reporting a high degree of awareness of cardinal orientation benefited from use of the VMGS, relative to the ARGS alone or in combination with the VMGS. All drivers benefited from ARGS enhanced by salient landmark information. Results of these investigations underscore the need to consider individual differences in the design of RGSs.

Daytime Running Lights: Costs or Benefits

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The present study investigated the possibility that road users in the vicinity of a vehicle with daytime running lights (DRL) would suffer from a decreased conspicuity because of the presence of that vehicle. In a reaction time experiment we investigated the effects of DRL on/off on the conspicuity of other road users, with particular attention to other factors that might moderate the magnitude of any DRL-effect (type of background, type of other road user, level of expectation with regard to DRL, etc.). Subjects viewed colour slides depicting natural daylight scenes of traffic intersections. The slides contained a car with or without DRL and possibly other road users such as a cyclist, pedestrian or motorcyclist. Subjects were instructed to determine whether any other road users were present or not, and they were instructed to react as fast as possible. The results of this experiment indicated no negative effects of DRL on other road users. We will present the results of this experiment in more detail and briefly present the broader framework in which this experiment was placed.

Assessment of the relative driver safety benefit of an advanced front lighting system

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An Advanced Front Lighting System (AFS) has been developed by Hella to improve drivers' road awareness and thereby improve safety at night. However, drivers may adapt behaviour to perceive risk equivalent to that experienced with standard headlights. This adaptation may involve driving faster, braking later, or avoiding obstacles at reduced separation.
This hypothesis was tested by recreating the AFS system on TRL's driving simulator. Twenty-one participants were recruited, completing drives in City and Motorway environments with AFS and Non-AFS lighting systems at night and under daylight conditions. In each route, participants responded to static obstructions. The resultant driving data was analysed across lighting conditions and event types. Participants also completed questionnaires to determine their subjective opinions of the lighting systems. The results demonstrated that although participants rated the subjective clarity of the AFS system greater than that of standard headlights, there were no significant differences in terms of speed, braking, or path. The hypothesis that drivers would adapt behaviour to experience an equivalent risk level was therefore rejected, suggesting that the AFS system would improve road safety. The suggestion was made that a longitudinal study should be performed to test how drivers adapt to the technology in the longer term.

Human-machine cooperation in car driving for safe lateral control in bends: function delegation and mutual control

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Within the framework of a French research program (ARCOS) aiming at specifying in-car automatic driving assistance in order to improve the trajectory safety, taking the best advantage of each entity in charge of driving (human and machine), two experiments were done on lateral control in bends. Two human-machine cooperation modes were evaluated - a function delegation mode (FDM) and a mutual control mode (MCM). With FDM, lateral control is fully automated (with easy return to manual control when turning the steering wheel) and longitudinal control remains under driver control. With MCM, the entire driving task is fully controlled by the driver, but the machine evaluates lateral control and can exert mutual control on the driver, either by an auditory and haptic (steering wheel vibration) warning or by a haptic action suggestion (asymmetric oscillation on the steering wheel). Two separate experiments were performed on a test track in order to evaluate the modes - one was devoted to FDM, the other to MCM. The FDM experiment demonstrated serious difficulties to return to manual control in situations where the device was invalid (obstacle skidding) and suggested a complacency phenomenon. In addition, spontaneous verbal reports indicated some difficulties in elaborating a mental model of the device and of the function allocation between the driver and the machine, as well as some negative interference between the driver's and the machine's driving styles. The MCM experiment mainly focused on the recovery from critical situations (deviations provoked by visual occlusions). The warning mode was found efficient, whereas the results for the action suggestion mode were not conclusive, for contextual reasons and because of larger individual differences. In addition, MCM appeared more efficient in the case of lane departure (toward another lane) than in the case of road departure (the stress is much more efficient than MCM). There is no complacency phenomenon with MCM.

X10 - are you looking at me?

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The X10 electronic communication protocol has been widely used for over 20 years and typically permits home automation devices to be operated remotely. Its use can be extended to encompass the control of virtually any ICT (Information and Communication Technology) device. Consequently, this approach lends itself for use by disabled individuals, particularly those who have mobility restrictions. However, with large numbers of ICT devices the resultant user interface can be cumbersome. The development of an adequate user-centred interface which will allow such an individual easily to operate multiple ICT devices is then a considerable challenge. We describe the development of a technique that utilises a user's point of gaze to select a particular ICT device for subsequent operation, thereby simplifying the user interface. All ICT devices in the environment are first digitally imaged from different angles to identify them to a computer imaging system. Subsequently each device can be automatically recognised. The user's eye movements are recorded and their direction of gaze related in real time to the known 3D location of the possible ICT devices so enabling device selection prior to operation. The development of the technique and current experimental trials will be described.

Interruption Handling Strategies: Empirical Classification and User Interface Design Issues

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External interruptions naturally occur in most of the realistic contexts in which people use computers and consumer devices. However, too many systems provide users with little or no support for the successful resumption of a suspended task after interruption. For example, if interrupted when summing a long list of numbers on a handheld calculator, a user cannot recall where he left off. Interruption of a complex hierarchical task such as VCR programming may result in complete loss of orientation in the task and subsequent starting the task anew. Our observations of users performing computerized tasks while being interrupted revealed that people make use of a variety of interruption handling strategies aimed to mitigate the deleterious effects of interruptions and facilitate the resumption of tasks after interruption.
We videotaped and analyzed the text editing task performance of 51 subjects which in total experienced about 300 interruptions (personal contacts, phone calls, instant messages and videoconferencing calls). First, when interrupted, the subjects demonstrated strong tendency to suspend the ongoing activity at natural breakpoints in the task sequence (e.g. at punctuation marks when typing in new text). Then, subjects made use of the computer environment itself for memorization of the state of the suspended task (e.g. positioning the mouse pointer over a command button in order to memorize the operation that should be done next). Another popular strategy was activity on preventing possible errors by avoiding potential error-prone situations (e.g. subjects might return the block of text from clipboard back to the screen in order to avoid possible loss of that block).
Based on the analysis of interruption handling strategies we propose a number of recommendations for the user interface design to reduce the deleterious effects of interruptions.

Assessment of high risk operator functional state markers in dynamic systems – preliminary results and implications

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In safety-critical human-machine systems the operator continually adapts to new and unforeseen changes in the dynamic process under control and determines what actions are required to prevent or correct for drifts or faults. Top-level task goals (e.g. system safety, productivity) are typically protected by increased investment of operator effort, though this has costs in the form of 'latent decrements' (e.g. increased physiological activation, use of risky strategies). For a period before manifest performance breakdown occurs, the operator is likely to be in a vulnerable (high risk) operational state, able to manage predictable demands but not necessarily unexpected or difficult problems. If we can detect the development of this state we would be in a much better position to predict periods of increased operational risk and prevent serious human-machine system failure, e.g. by using strategies of adaptive automation.

A complex decision making and simulated process control task is used to identify markers of compromised operator functional state (risk states). A new dynamic loading method forces performance breakdown through stepwise changes in task load, allowing risk states (those immediately preceding the breakdown) to be identified. Student operators provide data on performance and psychophysiological markers of risk (HRV, and two EEG power ratios – generalized beta/alpha and frontal theta/parietal alpha), offering person-referenced baselines for interpreting risk patterns.

Preliminary results for risk state indices will be presented and their prediction for performance breakdown discussed. The implications for using state markers in a closed loop system for adaptive automation will be outlined.

Customer trust in e-banking services

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There is still a large gap between expected and actual use of e-banking services. This gap cannot be explained in terms of technological inadequacies. Instead, it has been suggested that there is psychological resistance, which undermine users' trust in web-based services. Laberge and Caird (2001) identified a number of common psychological obstacles, and concluded that trust in online banking systems begins with being able to use them effectively:Usability and accessibility are the psychological preconditions of trust.
The present study aims to corroborate the idea that customers' abilities to use interfaces and usability of interfaces themselves have only a limited influence on users' willingness to adopt e-banking services. A survey, conducted using a multiple-choice questionnaire, filled in by two hundred people (half were early users and half had never used an e-business web interface), showed that early users were reluctant to use e-banking services when they did not trust the bank itself, notwithstanding the usability of interfaces. Naive subjects' choice not to use e-banking services depended on their personality traits.
The results confirmed that for early users the use of e-banking depend on its convenience and the level of trust attributed to the bank. Usability does not seem to play a relevant role either in the actual use of e-banking and in building up trust.

What does this button do? The problem of consumer documentation

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Most domestic equipment comes with an instruction manual. The more advanced the machine, the more complex the instructions. Digital phones come accompanied by manuals that exceed their volume by a factor of ten.

In practice, most documentation is filed and forgotten (or simply forgotten). Users learn to use the device for the specific tasks they need it for, and rarely explore the full possibilities of the device. Only when something happens that they do not intend do they resort to 'the documentation'. This they cannot find, or do not understand. If it is on a CD-ROM, they probably have to lose what they were doing in order to access the CD-ROM. If they are lucky, there may be a 'help line' they can call. If they are very lucky or very patient, they may get a reply.

The current situation is inherently unsatisfactory. Better methods for mediating between technology and users must be found within the contemporary social context.

Ergonomists are aware of human cognitive limitations and capabilities (Memory, recall, recognition, etc.) in the community as a whole, including the technophobe, the handicapped and the preoccupied. Education, formal or informal, is one approach, although "who teaches the teachers?" Another method, probably more effective with adults is the equivalent of 'mentoring', where help is given in a non-threatening context, by someone on the same socio-economic level - the 'Avon Lady' or even the 'Ann Summers' approach.

In general, consumers want answers to their problems, as they arise, and without 'losing face'. Formal training only works if it is immediately applied – unused skills rapidly decay. Solutions must be accessible, both physically and cognitively.

Another look at scanpath: distance to nearest neighbor as a measure of mental workload

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Visual scanning strategies have been often related to mental workload. In this study we investigated the relation between scanpath and workload on the basis of the consideration that low workload may be associated with regular patterns, indicating a regular check of the interface layout. According to this hypothesis, statistical indexes providing information about the dispersion of point patterns should indicate regularity in the case of low workload and grouping in the case of high workload.
Participants were engaged in a simple visuo-motor task: the pc-based game known as "Asteroids". The game was modified to suit the experimental purposes. Participants were engaged in two experimental conditions (balanced across subjects): "shoot" (participants were requested to fire the randomly moving asteroids) and "escape" (participants were requested to avoid collision with the asteroids without shooting them). These conditions generated different amount of mental workload since collision avoidance was perceived as harder than shooting. The number of asteroids on screen was kept constant along blocks. Eye-movements were recorded during the sessions and were analyzed using spatial statistics algorithms. Results showed sensitivity of spatial dispersion indexes to variations in mental workload and their potential utility as triggers for adaptive automation.

Using eye scan pattern-analysis for detecting task strategy differences in a simulated ambulance dispatcher's task

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Task performance measures or physiological state indicators (cardiovascular, EEG) are not always satisfactory for detection of differences in task strategy in operator tasks. One of the difficulties in interpretation is that subjects may obtain similar performance scores by using compensating task strategies. Eye movement patterns may give a better insight as additional information to performance and physiology. In the present study subjects are trained to perform efficiently an ambulance dispatcher's task, including both handling of emergency calls and ordered transport of patients to and from hospitals. Operators work with two screens consisting of an interaction interface and a map of the area to be covered. Scenarios are defined with periods of low and heavy task demands. It is hypothesized that task strategy differences in the two types of work load conditions are reflected in some of the measured eye scan-parameters: fixation and dwell times, entropy, blink frequency and pupil diameter.

The Efficacy of Advanced Visual Display Technologies in Simulated Airborne Command and Control Environments

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As information sources multiply, display cluttering is becoming more problematic in areas where the display space is limited. To address this problem, evaluations of the remedial potential of advanced visual display technologies should be conducted. This paper discusses the examination of head-mounted displays (HMDs) and the use of a multi-layered display (MLD) in an airborne command and control simulation environment. Eight participants engaged in air battle management tasks where they needed to retrieve information from one of the display technologies. This information was available via two types of HMDs, a MLD, paper, and on the primary display. Operator performance and subjective measures of workload and situation awareness were obtained for each trial. The results, in general, indicated that performance benefits were not realized between the different display types. Additionally, the HMDs, and MLD did not show a performance decrement as some previous studies have indicated. Further, participants reported lower subjective mental workload scores in the MLD condition and post-trial debriefing data suggests that the MLD was the preferred condition. Future research and potential uses of HMDs, MLDs, and other display technologies are discussed.

A new approach to design the internal vehicle layout: the "centred eyes posture", methodology and application to the concept car "Sportiva Latina"

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Nowadays the advent of advanced electronics and the availability of the By Wire technology inside the vehicle allow to revolutionise the approach to vehicle design. Thanks to this new approach it was possible to develop and realise the concept of "centred eyes posture" (CEP) presented in this paper.
CEP means that all the different subjects are accommodated in the vehicle in a way that their eyes are located in the same position, which optimises external visibility: front and rear visibility angles, pillars position and obstruction. This approach has also the advantage to improve the internal cluster and dashboard visibility, because the point of view is the same for all the users.
This concept implies the development of a system for the automatic adjustments of the seat in order to obtain a comfortable posture for the different drivers: the users do not decide the vertical or longitudinal regulation of the seat but only the backrest position. It is the system itself that decides the seat position so to

obtain the CEP. Furthermore the By Wire technology allows the automatic regulation of the users-pedals and users-dashboard distance.
The paper presents the methodology adopted and the application on the concept car “Sportiva Latina” presented at “Salon internacional del automovil de Barcelona”.

Social Proof and Decision-Making in Aviation

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This paper examines several accident reports to investigate how a pilot’s weather-related decision-making may be influenced by the decisions made by pilots flying in her/his proximity. Among all the possible theories on influence we frame the problem in terms of Cialdini’s (1993) concept of social proof, one that seems particularly appropriate for the analysis of accidents that occurred under potentially hazardous weather conditions in high-density terminal areas. Our applied examination specifically focuses on the case of arrivals/departures to/from busy airports under deteriorating weather conditions and argues that, under those circumstances, a very critical moment occurs when pilots should start making no-go or divert decisions after a stream of successful takeoffs and landings has been conducted. This detrimental effect is unfortunately exacerbated by the intrinsic and necessary features of aviation operations, such as emphasis on procedures and standardized training. Following our examination, we highlight potential streams of research that may yield significant results in this area, notably fuzzy Signal Detection Theory, Game Theory, and experimental and archival research.

Human factors issues in the remote piloted control: the Alenia Aeronautica experience

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The human factors issues in aviation design were and are considered a key element in the entire design process of the aeronautic product. In the last years, the introduction of new technologies such as unmanned air vehicles (UAV) where the pilot (operator) acts the aircraft in a remote way, have not changed the importance of human factors issues but have enforced their relevant role in the design process; in fact, from the statistical reports data collected on incidents and accidents occurred in the last years, it emerges how the percentage of accidents due to human factors issues still remain almost constant. Specifically, within the remote control of an aircraft, different human factors issues, with respect to the current ones, have emerged (new or current with different implications) and the best solutions are, at the moment, still an open issue. Based on the Alenia Aeronautica experience that it is on going with the development of an UAV demonstrator, the paper will describe the main human factors issues (e.g. control latency, motion sickness, workload, situation awareness, disorientation, decision making, etc.) related to the remote control of an aircraft, highlighting the relevant impacts on the safety. For some of those issues the solutions identified and adopted by Alenia Aeronautica using their unmanned air vehicle flight simulator facility will be presented.

Collaborative Decision Making from a learning perspective

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During the last decades an increasing number of people travel by air. Even with bigger and faster aircrafts this has lead to delayed flights partially due to inefficient ground handling at airports. One effort to increase efficiency is to improve flight related information at airports as well as collaboration between ground handling agents for optimal decision making concerning the aircrafts´ turn-around processes. Such cooperation, Collaborative Decision Making (CDM), will be studied as it is developed and implemented by Luftfartsverket and Eurocontrol at an international airport in Europe. The purpose is to exploratively analyze the needs involved employees have of participation and CDM related information and communication preceding the implementation. This paper presents the methods to be used to study these needs, and presents some results. Furthermore material will be presented of how CDM as a socio-technical cooperation system affects employees, man-machine interaction, and individual and organizational collaboration and learning. The learning perspective will be studied with a new model, "the Cube", which highlights five learning aspects: fact, skill, attitude, affection, and creativity. The man-machine interaction focus will be on the experiences and attitudes the employees hold towards the CDM system interface, the implementation process, and the expected CDM system use.

User-centred innovation of electronic documentation for maintenance

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Technical documentation has undergone radical changes over the last decade, in terms of software, hardware devices, documentation concepts, and intelligence of the systems to be maintained. The major drive for providing manuals in an electronic format is the ease with which they can be updated and customised. Besides industrial management, electronic documentation also offers greater flexibility for users in terms of search methods and layout possibilities. However, new ways of working with electronic manuals ask for re-thinking the ways information is structured and presented in various contexts. This paper investigates opportunities and challenges with regard to future maintenance manuals from a user point of view. New developments in the construction and use of electronic documentation are described and related to human factors. We discuss the mental models of users, users' trust in documentation, multi-modality, team work, the use of documentation during task performance, the relation to electronic systems in everyday life, the role of documentation with regard to self-repairing systems, and the contextualization of documentation. We give some examples illustrating improvements that may be realized in electronic documentation. The work presented in this paper originates from a study on current and proposed practices and developments in aircraft maintenance manuals.

A cognitive analysis of train driver information and communication

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There is a paucity of research that takes a systems view of the driver within the wider operational environment. By including the work of signallers, controllers and maintenance workers we can build a more complete picture of the cognitive processes operating at the systems level thereby identifying

information critical to the efficient, safe and profitable provision of rail services. We can also more fully understand the distributed temporal and spatial location of this information within the system, thus supporting operators' information and communication requirements through innovative technological, social and organisational interfaces. This paper reports on the early products of a train driver cognitive task analysis designed to elucidate the skill, rule and knowledge requirements of UK drivers within the context of developments in high speed train systems. Initial findings indicate considerable shortfalls e.g. in cab layout, information support, workload management, system monitoring and communications. We explore the possibility of addressing these and other problems through an enhanced cab interface that makes use of ecological interface design principles. Such a system would allow drivers to make better use of perceptual information - managing speed and journey trajectories more efficiently, and moving more effectively and reliably between different levels of driver functions.

Usability and ergonomic evaluation of in-car multifunctional systems: a tool for Human-Factors professional

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During the last years the automotive industry has shown a remarkable tendency to position multifunctional, navigation systems in cars. This trend, added on the increase of the number of safety and comfort devices in the vehicle, opens a number of ergonomic questions. To guarantee safety, it is instrumental to understand what are the ergonomics and usability features of these devices and subsequently, driver's performance in using them. As a matter of fact, in applied research field, it is not always feasible for times and costs reasons to have users testing devices in experimental settings. In order to give Human Factors professional the possibility to collect useful indications on different systems, a tool has been created. The tool collects different Ergonomics and Usability guidelines that support Ergonomists in describing each system taking into account for example input devices typology, output devices characteristics, interaction strategies conveyed by the system, time needed to complete different tasks. The tool has to be considered a qualitative instrument useful to collect data and indications. Since it can be applied in an easy and quick way, it may help Human Factors professional in identifying particular strengths and weaknesses of a system before performing different evaluations. Moreover, it can be useful during the initial design phases of a new system, to avoid gross usability problems.

Human Factors in Off-highway vehicles – Design and prototyping of a control and information visualization system

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The recent development of electronics in off-highway vehicles has led to an increase in the complexity of the operator's activity. The introduction of new devices and controls modifies the human operator's role, both quantitatively - due to the larger number of required actions - and qualitatively - due to the introduction of new functions and to the automation or reallocation of old ones.
The present study, conducted in the framework of a funded project (PROTRACT), is aimed at developing a Distributed Control System (DCS) with an innovative control device (multifunction joystick) and display (virtual terminal).

We first present a review of the existing studies concerning Human Factors in off-highway vehicles. Second, on the basis of a task analysis aimed at defining the functions to be implemented, a prototype of a newly designed control and information visualization system was developed. Finally, an experimental evaluation of the prototype's usability was conducted in order to detect main problems and benefits. Results will provide valuable insights for the development of intuitive, adaptive automation systems in off-highway vehicles.

Definition of ergonomic "intervention guidelines" considering interaction errors: expert and users methodology for automotive multifunctional systems

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Product development highlights the necessity to define rapid and operative guidelines, to improve usability and interface pleasantness. For this reasons, CRF created for FIAT-Auto a specific methodology that, through a deep interaction errors' analysis, finds the criticalities of an interface. The interpretation of these results allows ergonomic experts to define operative intervention guidelines, from a User–Centred-Design point of view. Moreover, it allows a comparison among different simulations of the same systems or different brand's ones. In this way, it is possible both to develop a system classification and to evaluate the specific solutions adopted.
The methodology can be described as follows:
On the basis of past researches, a categorization of interaction errors has been defined (e.g. feedback errors, localization errors). General categories were chosen in order to be applied to all types of automotive interfaces.
Participants were asked to execute a group of different tasks with the system(s) under evaluation. The tasks were chosen on the basis of a previous research, developed by CRF, that identified the most used functions by drivers in daily life. During the trials, a researcher observes the users' behaviour and records all type of errors done in a predefined grid.
The severity of errors is weighted on the basis of the number of attempts done by participants to successfully carry out the given tasks.
The methodology has a twofold main advantage:

- quickly applicable to different products (multifunctional or simple ones) at different levels of development (on-board system, PC simulators);
- usable both during expert evaluation and users evaluation, obtaining quite the same results.

In this paper, the methodology and some application cases are described.

Enhancing User Centred Design Methodology: Interactive Television Services for Older People

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Twenty years after the first development of UCD design philosophy, there have been some recent and helpful observations concerning certain aspects of the UCD approach that could benefit from further enhancement, such as investigation of user demand and user involvement during the earliest phases of design.

This consideration oriented the present study, which examined the applicative case of designing interactive television services for older users in home environments.

During the first phase of the study, thirty 60- to 75-year-old participants were interviewed in detail in order to learn more about their use of time and the services they use in their activities. The same participants were later asked to comment on and evaluate service-evocative paper prototypes, which had been conceived based on the interview data.

This methodology represented a relevant step in the investigation of user demand: the concrete knowledge we obtained concerning user activities and aims enabled us to go beyond an analysis of demand intended as the survey of opinions and desires, towards the construction of a dynamic image of real users. Moreover, our sample played an active role from the earliest phases in the ideation of services; this helped us achieve the objective of considering users as integral part and focus of the design process.

* A research project conducted in co-operation with Telecom Italia Lab

Travel Information in a real setting

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On a Full Colour Information Panel (FCIP) any graphical picture desired can be displayed, for instance the structure of a route. In providing travel information this has important advantages, particularly in case of congestion. It is possible to reduce levels of uncertainty experienced by travellers when advised to change routes, for instance by showing graphically that all routes lead to the same destination (e.g., a parking place). The challenge is to provide as much information as possible and benefit from the possibilities the FCIP offers, without neglecting cognitive ergonomic guidelines. Several experiments were carried out, in order to examine how information should be displayed on a FCIP.
Paper-and-pencil questionnaires were followed by reaction-time experiments in the lab. In the next phase, experts were asked to judge different designs. Then, subjects were asked to rate usability of FCIP designs while watching films in which FCIPs were projected. The last and most important part of the experimental cycle was an experiment in a real setting. An FCIP has been placed over the highway A12 near Scheveningen (The Netherlands). During a four-day festival, different designs were displayed on the FCIP. Visitors of the festival were asked their opinion on the designs. Results of these studies will be discussed.

Comprehensibility of graphical symbols for clarifying security features

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Commissioned by the European Central Bank, De Nederlandsche Bank has been investigating the application of graphical symbols on banknotes to inform users on how to verify the various security features. There are eight types of security feature (e.g. watermark, security thread, hologram) and five categories of verifying action (e.g. 'look', 'feel', 'tilt', 'magnify'). Two studies are reported here in which the comprehensibility of candidate symbols was investigated. In the first study promising symbols were selected from among 28 existing or newly designed symbols. The method of ISO's comprehensibility judgement test was followed, in which the task of participants is to estimate the percentage of the user population that they expect to understand a symbol's meaning correctly. Based on the results of this test a coherent set of symbols was chosen, not depicting the security features but the verifying actions. In a second study three of these symbols, indicating 'look', 'feel' and 'tilt', were tested using a variant of ISO's comprehension test. Participants were given a simulated banknote with symbols added and were asked to perform the verifying actions indicated by the symbols. The results showed that the comprehensibility of the 'look' and 'feel' symbols was sufficient (72% and 70% correct responses) but that the 'tilt' symbol (51% correct responses) needed redesign.

Ergonomic Design of Machinery and Workplaces in the food industry

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Food industry is one of the most important economic sectors in the EU. In many representative workplaces of this sector like food warehouses, supermarkets, slaughterhouses or food production chains, there are bad ergonomic working conditions related to high repetitiveness, awkward postures, handling of loads or inadequate task organization. The Institute of Biomechanics of Valencia (IBV) has carried out a study of the ergonomic working conditions in the food industry focused in the identification of the main ergonomic risk factors and in the proposal of recommendations to improve such ergonomic conditions. This study was based on Ergo/IBV, a methodology developed by IBV to analyse ergonomic job risks related to manual materials handling, repetitive tasks, inadequate postures, office work and pregnant workers. In workplaces with higher ergonomic risks, a more detailed analysis was carried out, including a detailed redesign proposal; for instance, the 'fruit selection and packing' tasks, two of the most representative workplaces in food warehouses in Spain, were deeply analysed. As a result of this study, detailed design recommendations were provided and dissemination of results to machine manufacturers, food enterprises and end users all over Spain was carried out.

Ergonomic re-design of existing patrol vessels

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The present paper describe the application of the Human Factors and Ergonomics criteria and guidelines to the re-design of old patrol vessels. In particular the analysis consist of the following steps: analysis of the ship and systems design, analysis of the specifications, identification of the standards and rules applicable to the ship examined, identification of the ergonomic critical areas, analysis of possible new solutions, integration with the designers, identification of the design and cost impact of the new solutions adoption. The scope of this analysis is double: the re-design for the ship middle life maintenance activity and the re-design for foreign customer proposal. This paper underline the importance of the application of Human Factors criteria to the ship design.

Poster abstracts after the oral presentations

User Preferences for Products in Physical and Virtual Domains: A Comparative Study of Audio Players

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In the past few years, developments in digital technologies have emerged to create an almost immediate impact on user lifestyles, leading them into new ways for acquiring, managing and distributing music, radio, and assorted audible media. These developments represent a fundamental lifestyle shift in the way users enjoy and personalise media at home, on the road, and at work. This transformation is happening through, for example, software applications that combine networking and digital music technology. Portable audio devices are proliferating just as widely. Until recently, user preferences of products have mainly been linked to product functionality. Today, it is commonly believed that experiential benefits of a product play just as important a role on the user preferences. Therefore, understanding the experiences of users of current and emerging products can enhance the quality of new product development.

This paper focuses on the product expectations that users have when they are confronted with audio products.
It presents the results of a comparative study conducted with twenty users to reveal the similarities and differences of their expectations from portable audio devices versus software audio players. Analyses using Repertory Grid Technique are described, followed by discussions on how user expectations change when a physical or virtual product is of concern.

Field-tests for the validation of the Driver Model in the AIDE-SP1 European Integrated Project

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The main goal of this paper is to illustrate the experimental activities carried out in the AIDE – SP1 project, in order to validate the Driver-Vehicle-Environment (DVE) Model.
The model aims at representing the mutual interactions of the three main agents in the autmotive domain: the vehicle, the human being and the environment in which the first two agents are dipped. These sub-models are described by a set of parameters and independent variables; in particular, the ones correlated with driver's model are:

- Attitudes/personality
- Experience/competence:
- Task Demand
- Driver State
- Situation Awareness/Alertness
- Intentions/goals

The parameters have been associated to measurable quantities in order to implement them in a dynamic DVE model.
The physical data have been got using an instrumented car while the needed subjective data derived from two questionnaires filled in by a sample of subjects.
The data collected will be analysed by mean of Factorial Analyses with the aim to highlight the hypothesised structure underlying the data matrix. If the supposed relations will be confirmed by the analyses we will be allowed to assume that the model proposed is sufficiently appropriated for the DVE representations. The results of the analyses will be discussed in the final version of the paper.

Developing new products: how orderly should the process really be?

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The classical view of the ideal product development process is one of a step wise process, in which the first steps consist of identifying (consumer)needs, investigating and analysing the current situation, and based on the collected information, defining the requirements for the new product. This will than be followed by developing a number of concepts, which usually are evaluated and refined in an iterative process. Testing

prototypes (in varying degrees of detailing - from nonfunctional mockups, to functional prototypes), involving the target users is a part of this step. This will lead to a complete specification, which is used to further develop the product and make it ready for manufacturing. The next step will be launching it onto the market, which again can be accompanied by following the product, monitoring product use, and user response. This could become the input for a next cycle of product development.
However, in a study in which a number of cases in industry (varying in domain and size) were analysed, it became clear that development of products does not always follow such a structured, stepwise process, in which the order of steps is fixed. It turned out that extending the range of existing products or rejuvenating an existing product results in a different process being adopted compared to a situation were an entirely new product needs to be invented or even a completely new market is being explored. These differences result in different needs with respect to the input that can be (and needs to be) provided by human factors specialists. In the presentation the results of these case studies, and the lessons that can be learned from them will be discussed.

Design and evaluation of a believable TV-assistant on user interface robot iCat

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The project described in this paper investigates the design and evaluation of a believable personality on a user interface robot, which helps viewers finding a TV programme that fits their interests in an enjoyable manner. Questions that were addressed in this study included: What personality do users prefer in interactions with the iCat as a TV-friend? What level of objective control do they prefer? How do personality and the level of objective control relate to each other?

A preliminary study showed that it is possible to convey believable personalities of the TV friend to the user, by applying various social cues in facial expressions, motion, speech, and linguistic style for different personalities.

Based on the outcomes of the preliminary study, two personalities for the TV-friend were designed for two different levels of user control. For the high control condition, a “command and control”-like application was developed, whereas the application in the low control condition was more like a spoken dialogue system.

Data were collected through an experiment in which users interacted with the TV-friend, while watching television. They were asked to assess the personality of the TV-friend, and to give their opinions via questionnaires and an interview. In the paper, details about the test set-up will be discussed, and the results of the test will be presented.

Transfer of fuel-efficient driving technique from the simulator to the road: steps towards a cost-benefit model for synthetic training

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TRUCKSIM is a programme of research focused on simulation as a training delivery tool for skills development in qualified truck drivers This paper reports on results from a longitudinal cohort study that sought to provide a detailed analysis of the benefits of synthetic training in the area of fuel efficiency improvement. 56 drivers were recruited to visit the truck simulator on three separate occasions and receive training designed to improve driving style in a range of traffic situations. Apparent fuel consumption figures were recorded during each simulator visit, and compared to real world fuel consumption records for the same drivers. In addition, fuel consumption data were obtained for a matched cohort of drivers over the same period who did not attend the training. The method for the study is detailed, and the framework for converting vehicle performance data into usable training feedback for the driver explained. The mean change in fuel efficiency observed of drivers in the simulator group was an increase of 15.7 %. The implications for the development of cost benefit models for synthetic training are discussed.

Remote versus Laboratory Usability Testing: A comparative study

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Whilst testing the usability of a product in a usability laboratory, facilitators generally try to extract usability information from a representation of 'context in use'. Although laboratory testing gives considerable amount of information on the usability of a product, there might me cases where it is difficult to simulate the real-world usage due to lack of contextual information (e.g. scarcity of information on low-socio-economic status users' living conditions, etc.), or physical limitations (e.g. difficulty of simulating driver's actual behaviour, etc.).

This paper presents a comparative study of a telephone set, tested both in laboratory setting and in natural work setting. Discussion is made on the relative advantages and disadvantages of each setting, along with the technical infrastructure and number/severity of
usability problems identified. Preferences of participants and facilitators of each usability evaluation setting are also discussed.

Finally, suggestions are made for the practitioners who are willing to conduct remote field usability tests.

Modelling co-ordination effects in complex work systems: The aviation maintenance case

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Aviation maintenance teams deal with continuous exchanges of human and technical resources within their organisational environment. This constant collaboration with their environments is paramount to perform their main function: maintaining the aircraft proficiently and safely.

Notably, life in work teams across hangars is heavily dependent on the reliability of other support individuals, teams, departments or functional units around the core group performing the maintenance task (Patankar and Taylor, 2004). Following on from this it is expected that co-ordination functions maintain sound and reliable teamwork across work processes and joint activities in hangar maintenance. Unfortunately, co-ordination systems in hangar have frequently shown to be unsatisfactory compromises between need of flexibility and tight control on teamwork. Most importantly, little human factors research

to date has generated insights and new knowledge on quantitative methods to verify co-ordination systems and measure the impact of associated dysfunctions.

In this framework, this paper presents a new audit-oriented methodology designed to satisfy the analysis of co-ordination systems operating between and across work teams, and large departments within critical processes. The area of application covers the hangar maintenance operations in the commercial aviation.

The proposed Co-ordination Audit Methodology (CAM) brings together the research effort conducted within the EU funded Research Project called ADAMS 2 (FP 5). The methodology will be described as means of verification and quantification of performance and economical impact associated to faulty co-ordination systems.

Overall, the CAM method describes a process-audit intervention based on four steps:
1. Identify the target of analysis (a work process)
2. Assess the target composition in terms of work groups and their relations
3. Verify the presence and actual location (in the work process) of specific indicators called co-ordination dysfunctions (affecting the relations within and across the work groups)
4. Quantify the impact of co-ordination dysfunctions against specific Performance/Economical Indicators (i.e., % of Task interruptions, man/hrs lost etc…) and provide informed Cost/Benefit-oriented solutions of change.

Three different case studies will bring together the results obtained from three different European maintenance companies which tested separately the methodology on selected work processes.

Vigilance in ATC: the quest for an appropriate definition

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The commonly applied definitions of vigilance focus mainly on one of three components: 1) the cognitive aspect stresses the concepts of attention and perception; 2) the physiological aspect emphasises the alertness as indicated by EEG measures; and 3) the behavioural component centres the detection of irregular or rare events in the environment. Illustrative examples from different sources demonstrate the need for a clear integration of those aspects. A survey of 139 controllers in 4 European Air Traffic Control Centres (ATCC) revealed a gap between the current theoretical concepts and the controllers' perception of 'low vigilance' and provides insight into related cognitive aspects. An experimental study on monotony in simulated ATC with 24 controllers included the physiological perspective when investigating the psychophysiological effects of repetitive traffic situations. Analysis of the causes of ATC incidents can be linked to the performance component. Work-related critical states such as monotony or fatigue need to be distinguished and the role of distractions clarified. We discuss limitations of the currently available vigilance concepts and propose a definition and its implications that may satisfy the needs not only of researchers, but also of controllers and incident investigators applying the vigilance concept in the domain of ATC.

Understanding Incident Reporting Systems in Practice

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The focus of this study is on the practice of incident reporting systems in the aviation industry. Using qualitative methods including Grounded Theory Analysis of semi-structured interviews I compiled and related the emic perspective of commercial air transport pilots at a cross-section of air transport companies in Sweden. The results of this study demonstrate that the different components of an incident reporting system are interdependent – in particular, issues related to the solicitation of reports cannot be isolated from the outcome and purpose of the reporting system, and the feedback of this information to potential system users. The course of this research illuminated some complex peripheral issues including the influence of national culture on the application of these types of organisational safety initiatives, the difficulty in defining 'incident' given the subjective nature of what is 'unsafe', and the importance of broadening checks to the management of the gap between practice and theory. This report provides a framework and several hypotheses which could be useful for future development of the theory and nature of incident reporting and as practical considerations for incident reporting system administrators.

POSTER Presentations

Development of Expertise in Detecting Terrorist Threats at Airports

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In order to improve the performance of airport security personnel in searching images of air passenger luggage it is important first to fully understand the requirements of the task. Here we investigated the visual and cognitive factors that underlie the visual inspection of these complex images. An experiment is reported where observers searched 50 X-ray images of air passenger luggage for potential terrorist threat items. These items included guns, knives and improvised explosive devices. For each image their eye movements were recorded remotely and they had to rate their confidence in whether a potential threat item was present or not. If present they then also had to indicate its location. Two groups of observers took part; naïve and experienced airport security personnel. Data were analysed in terms of performance and also in terms of visual search factors including areas of interest attended to, search times, and objects selected. The data are discussed in terms of the development, both of expertise and of appropriate cognitive schemas.

Usability as a mental representation: firmitas, utilitas, venustas

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The definition of usability provided by the International Organization for Standardization is undoubtedly useful in order to make it clear what usability is in a normative perspective. However, it also lacks of consensus among researchers that can rarely link “efficacy”, “effectiveness”, and “satisfaction” to measurement procedures and sound theory.
In this paper we show how the usability construct can be usefully conceptualized as a mental representation that users develop in order to interact with technology. Particularly, we consider usability as a multidimensional construct deriving from users evaluation of three main dimensions: mental handling, perceived utility, and attractiveness. These factors would represent calls to schemata users developed for effectively perform a task using technological artefacts such as web sites.
Results of a six-year research program on usability measurement are reported by describing the development of the Usability Evaluation (Us.E.) questionnaire, its reliability and validity. Particularly, a description of the theoretical framework will be provided, and the reasons of migration from the version 1.0 to 1.1 of the questionnaire will be described. Finally, we will report results of studies aimed at assessing the sensitivity of the scales to variations in interface structure, content, and visual features.

Therapy tools for autistic children in Indonesia :user-centred design

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Autistic Spectrum Disorder (ASD) is a delay of growth of children's abilities, such as communications, emotions, intelligence, behavioural, and motor skills. These delays may cause severe problems in every aspect in children's life. The cause of this disparity is very complex, varying from genetic factor, environmental, immunological, and biological and many other aspects. In Indonesia, the statistic shows that in the last decade there was only one autistic child per 5000 children. Today, the number has grown rapidly to three autistic children per 500 children. Furthermore, it is predicted that 60% of the children in the world are autistic by the year 2010.

It is essential to give a correct therapy or medication for the autistic children. The goal of this therapy is to lessen the problem arising from their behavioural conduct and to improve their ability to communicate. Therefore, in line with user-centred design principles, the therapy room and tools should be engineered and designed ergonomically for the special condition of autistic children. The therapy room and tools should be able to overcome problems arise from autistic behaviour, such as tantrum, difficulties to concentrate, etc.

The purpose of this research is to design an ergonomic therapy room and tools in terms of satisfying special needs for autistic children. The design of the behavioural therapy room concerns with the environmental factors, such as illumination, noise, colour, temperature, humidity and safety. The therapy tools are designed to achieve the purpose of integrating the speech therapy and the occupation therapy; the occupation therapy comprises the play therapy, the music therapy, and the sensory integration therapy.

Digital Integration – Human Opportunities, Challenges, Constraints

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The simultaneous growth of digital computing, digital image processing, satellite navigation and communications is producing a crop of ingenious devices, being released onto the market with little other than economic constraint. The social impact of many of these devices has clearly not been considered by the makers.

For example, the integration of satellite navigation with cell phone communication provides users with location information and detailed navigation advice. As usually envisaged, this system is triggered by the user, and signals to the user. Similar ‘TRACKER’ devices are installed in vehicles to enable the location of stolen vehicles to be identified rapidly, by interrogation devices operated by police and customs officers. A current proposal in the UK suggests that such devices may be installed on all vehicles to charge for the use of roads according to congestion and road quality. This proposal implies that the position of each vehicle is recorded more or less continuously. In general, it is now possible for the movement of digitally identified items, whether vehicles or equipment to be recorded as a standard procedure. Equally, the use of digital CCTV monitoring, combined with advanced facial recognition systems, can continuously monitor the movement of human individuals. Schemes are under consideration for routine machine identification of bank-notes in circulation, with the aim of identifying stolen money or ‘black economy’ transactions. In the UK, proposals are being considered for ‘biometric’ identity cards, providing allegedly unequivocal identity information. The USA already requires the introduction of some such identification in passports for visitors.

In general, the economic trend is to integrated recording systems. Who should be allowed access to all this information? When is the right of privacy of law abiding individuals infringed? Already, police routinely obtain details of cell phone use by suspected individuals, via the records maintained for charging users. Banks are required to report movements of large sums of money, and interest payments.

However these systems evolve in the future, they will be operated and administered by human beings. Mistakes, slips, errors and deliberate abuse are inevitable. Ergonomists are aware of human cognitive limitations and capabilities (Memory, recall, recognition, etc.) in the community as a whole, including the technophobe, the handicapped and the preoccupied. They should now be considering probable future problems, rather than waiting to criticise technically sophisticated but psychologically naïve products. Some suggestions can be made on how to bring these problems, with their possible solutions, to the attention of designers and engineers to prevent rather than rectify costly errors.

On the quality of the communication systems and the attention to the other

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I would propose a talk about the usability of communication systems, showing examples from different fields of human communication, from road signs to human-machine interfaces of application software, from the interface of everyday things to multimedia web pages.
I would trace a path that, from Heidegger's distinction between usability (Zuhandenheit) and availability (Vorhandenheit), moves through Bachtin's theory of the novel (meaning as a mediation between sender and receiver and function of the receiver's knowledge), and Gadamer's hermeneutics (the interpretation of a text requires Horizontverschmelzung, that is the merging or fusion of the reader's horizon with that of the text) to the ideas of Nielsen and Norman about usability and the concepts of user centred design and universal design.
At the end of this path I wish to claim for a design attitude that should take into account the "other" as a design target and a reference for the quality of the communication, both from an ethical perspective, following Lévinas, and from an economical one; where this "other" should be both the receiver of the communication (quality in use), and the future sender, in case of maintenance of the communication system (internal quality).

Evacuating a building using mobile phone text messages; a baseline measurement

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In an emergency situation where an evacuation is needed, rescue services often arrive after the start of the evacuation. Therefore, it is of great importance that people are self-reliant and are able to rescue themselves from the start of an emergency until the time the rescue services arrive.
Convincing people to behave according to what is expected of them can enhance emergency self-reliance and can be realised by giving them messages with relevant information about what is going on and what should be done.
These messages can be conveyed through different media. This study looks at the possibilities of using mobile phone text messages in evacuating an office building. The effectiveness of several different SMS messages will be tested in a large office building that consists of 12 equal and separated sections, each occupied by about 60 people. The aim is to find the optimal information content for an SMS message that will be sent to everybody in a building as soon as the fire alarm bell sounds. The optimum will be

determined by comparing total evacuation times. This paper will present the baseline measurements and the first results of the study.

Task analysis, subjective mental workload and incidents in airport tower air traffic control during adverse weather conditions

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Airport tower air traffic controllers change between observing traffic on ground and in the air through looking out the tower windows and following the traffic on radar and computer screens. The change is mainly guided by weather and visibility. During adverse weather with limited visibility the air traffic controller can only see parts or even nothing of the runway and taxiway/apron system. In those conditions the controller has to rely on his support systems (radar, computers). Spring 2004 a study was carried out in the control tower of a major airport, collecting observational data and assessing mental load. During the data collection period weather conditions were excellent and controllers mainly worked looking out through the windows and rarely used the support systems. Results from this study were presented at the Europe Chapter of HFES Annual Meeting in Delft, 2004. A continuation study was stated in January 2005. This time data are only collected during adverse weather conditions and data collection will continue well into this fall. Preliminary results from this study will be presented in poster format.

Recent Accident Trends in the Aviation Industry

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This paper examines human factors and organizational psychology issues that were highlighted by recent airline accidents. An analysis of NTSB accident reports reveals that eighty percent of Part. 121 (Air carrier) crashes that occurred between 1996 and 2003 involved some kind of inappropriate, confusing, or inexistent procedures. This percentage has been consistently increasing throughout the years (43% for 1982-1989 and 53% for 1989-1996). We examine what organizational factors most likely allow this detrimental phenomenon to take place and we call for a widespread effort to promote a more proactive safety approach, one that would integrate and not supersede the current stance on safety issues.

Among the instances that we analyze are the Charlotte Air Midwest crash (with the issue of weight and balance data), the Tallahassee Fed Ex accident (color-blind vision requirements) and American Airlines 587 (rudder reversals). We also examine the limitations of the industry's current approach to safety by discussing organizational inertia, the evolving needs of aviation safety, and the working climates that are most commonly associated with open and thoughtful discussions of safety matters. We conclude by providing practical advice on how to foster the type of constructive safety culture that our paper calls for.

Study of Occlusion Technique for Making the Static Evaluation Method of Visual Distraction

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The purpose of this study is to clarify the suitable static test method to evaluate the total glance time (TGT) for the car navigation systems while driving. Four kinds of navigation systems, (touch panel, joy-stick, remote control and rotation), were tested. When the subjects operated the navigation system repeatedly, the single glance time was 1.0 second for the navigation display and 0.6 second for the forward traffic situation. The upper limit of the total glance time for the navigation display estimated from the subjective feeling of the uneasiness and the lateral deviation was 8 seconds. Total task time (TTT) and Total Shutter Open Time (TSOT) based on Occlusion Technique were evaluated as indexes that could be used in a static test instead of using actual vehicles. TSOT had higher correlation with TGT than TTT. The occlusion pattern for TSOT with 1.5 seconds open time and 1.0 second close time had the highest correlation. TSOT of 7.5 seconds was equivalent to 8 seconds for TGT. In addition, it became clear that there was no problem even if this guideline is applied to the elder driver.

Evaluation of a driver's state of attention while conversing on a cellular phone

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Effects of hands-free-phone conversations on drivers f visual behavior and detection performance were examined using a gaze tracking device and fixed-based driving simulator. Subjects were participated various conversation tasks (simple/arithmetic/unconstrained) while following a lead vehicle. Results showed that not only demanding arithmetic task but also the unconstrained natural conversation task increased reaction time to visual target. Furthermore, during natural conversation task, amount of the dissociation of binocular gaze direction was significantly increased. A follow-up ophthalmostatometry test showed that the dissociation angle of binocular gaze direction corresponded to a latent deviation of the eyes (individual resting position) which called phorias in ophthalmology. This phenomenon occurs when the visual image fusion between the eyes is disrupted. It was suggest that hands-free-phone conversations can affect driver's visual behavior, which appeared as individual resting position. In this state, an event detection performance can be impaired as the consequence of degradation in perceptual aspect of driver's information processing.

Automated in vehicle systems towards driving stability

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IVIS (In Vehicle Information Systems) and ADAS (Adaptive Driver Assistance Systems) modify driver's behaviour and in risky situations may affect driver's SA (Situation Awareness). In the AIDE (IST-1-507674-IP) project, models for joint driver-vehicle interaction are under analysis in order to enhance design process, safety expectations in these new technologies, and embed consideration for the "joint" human machine system. Few studies analyse behaviour alteration arisen from the IVIS and ADAS intervention, due also to difficult experimental set up and amount of parameters to be considered. In order to obtain low cost ways to perform tests and simulations of Human Machine Interaction (HMI) in terms of prediction and security, it is essential to identify a theoretical model that describes the limits of stability. This can be achieved considering well established models based on control theory, adding "disturbance" input variables conveyed by the intervention of ADAS and IVIS. A preliminary attempt to simulate DVE interactions is based on modelling perturbations as:

- noise on steering control
- delay in trajectory planning
- delay and loss of recognition of target information

This tool, under construction, is built up by means of OOP (object oriented programming), and is architecturally designed in order to add new scenarios and behavioural control models. The simulation is conducted by means of SIMULINK (Matlab) and an on purpose tool developed by means of OOP.
This study will discuss the basic underlying assumption of the simulation under development and will show some preliminary results on sample cases.

User Centred Design In Dentist's Work Method

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Dental, gum, and mouth hygiene is definitely important to take care of. It's not only for the sake of health, that the disease in the oral area may relate to the other disease and it may cause death, but moreover, it is also essential for the aesthetic value as it is located in an open area and easily seen. That's why dentists play an important role in this case.
One thing that people don't pay much attention is the importance of the dentist's health itself. Whenever he is dealing with patients, he needs to bend, bow, turn his body/neck, rise up his upper arm/shoulder, and hold in that position for quite a long time and he needs to repeat those actions as well, which may cause back, shoulder, arm, and neck injury.
To prevent the injury, it is wise to change the work system or to repair/add the dentist's equipment so the dentist can work easily and comfortably.
To analyze how important those things to be fixed and repaired soon, in this research has use an analysis tool called Ergoweb® Job Evaluator Toolbox (Ergoweb® JET), because this tool is serve amount of strategy and research that can make user work easily and not have to start a research with a symptoms of problems, however this tool can be used with only start in using a checklist then use a right analysis tool to analyze the problem and to determine the best solution for that problem.
From the evaluation and analysis that has been done on 6 position of dentist which is divide by an area of mouth and teeth (regio), it is gave an indication that work condition of a dentist are very uncomfortable and unsafe, so it needs a repair action. And that so, this research offers some suggestion that make a dentist condition better and close to an ideal condition based on analysis tool in Ergoweb® JET.
This research is also re-evaluated the suggestion solution and to check back if it is really has a good result for the dentist condition. This evaluation is still using analysis tool in Ergoweb® JET and it gave a result that suggestion solution is better than before. It means that there is a decrease of risk that happen on dentist so that the dentist can do his/her works in a safe condition and more comfort.

Methodology to obtain ergonomic criteria for accessibility and accomodation to vehicle of people with reduced mobility

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The study here presented focuses on quantifying the way a vehicle can be optimally designed to offer an easy entry and a comfortable accommodation to people with mobility impairments.
The goal was to identify the ergonomic vehicle specifications relevant to guarantee a comfortable access and driving position to people with reduced mobility, who have stricter requirements that, if accomplished, lead to an improvement of the comfort for all users.

The paper deals with the methodological approach adopted in the study, based on the User-Centred Design approach. The users were involved in each stage of the research: disabled drivers and passengers participated with interviews, Focus Groups, questionnaires and laboratory tests. Associations of disabled people, vehicle manufacturer and adaptations suppliers were also asked to participate in order to allow the mediation between constraints and requirements.
As a result, ranking of the vehicle features on the basis of the relevance they have for disabled people was obtained. Furthermore, accessibility and driving position ergonomic criteria expressed as numerical ranges for each relevant vehicle dimension were identified and can be applied in the design of new vehicles.
The study was carried out in collaboration with FIAT AUTO and the FIAT AUTONOMY program.